



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/575,298	05/19/2000	Peter Elenius	5833-A-11	1299

7590 05/24/2002

Cahill Sutton & Thomas P L C
Attn Marvin A Glazer
155 Park One
2141 Eaast Highland Avenue
Phoenix, AZ 85016

EXAMINER

PAREKH, NITIN

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 05/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/575,298

Applicant(s)
Elenius et al

Examiner
Nitin Parekh

Art Unit
2811



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Feb 10, 2002
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above, claim(s) 1-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 2 and 6 6) ☐ Other: _____

Art Unit: 2811

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 16-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dockerty et al (US Pat. 5796169) in view of Jonaidi (US Pat. 6091155), Lee et al (US Pat. 6050832), Barrow (US Pat. 6118182) and Thompson (US Pat. 5011066).

Regarding claims 16-22, Dockerty et al disclose a device/apparatus comprising a reflowable/composite solder bar/support formed on an upper surface of a first substrate (Flip chip device 3 in Fig. 3 and 4), the substrate having a first electrical contact and the reflowable/composite solder bar/support being adapted to join the first electrical contact to a second electrical contact on a second substrate (1 in Fig. 1-5), the solder bar/support comprising in combination:

Art Unit: 2811

- a. a first conventional circular solder pad (4 in Fig. 3 and 4) formed on the upper surface of the first substrate, the pad having a center and first predetermined diameter/D
- b. a second conventional circular solder pad (4 in Fig. 3 and 4) formed on the upper surface of the first substrate, the pad having a center and first predetermined diameter/D, the center of the second pad being spaced from that of the first pad by a predetermined spacing/distance/BL (see the solder bar/support connecting the first and second pads in second column in Fig. 3)
- c. a solder bar pad of first predetermined width/BW (15 in Fig. 4) formed on the upper surface of the first substrate connecting the first and second circular pads, BW being approximately equal to or slightly less than D (Fig. 4)
- d. a mass of reflowable/composite solder comprising high melting temperature(HMT)/low melting temperature (LMT) solders and having a volume/VB formed on the first and second conventional circular pads/solder bar pad to form the reflowable/composite solder bar/support (16/20, 17/20, 18/20 and other bars/supports connecting two or more pads etc. in Fig. 3 and 4) reaching a height H1 and H2 above the centers of the first and second pads and the midpoint of the solder bar/support respectively (16, 18, etc. in Fig. 4)
- e. values for predetermined D, BL, BW are such that H1 is approximately equal to H2 (Fig. 3 and 4; Col. 4, line 50-65), and

Art Unit: 2811

f. solder bumps/balls (Fig. 4; Col. 4, line 53) having spherical/circular shape having a height H_3 where H_3 is approximately equal to H_1 and H_2 .

(Fig. 1-5; Col. 2-5).

Dockerty et al disclose H_1 and H_2 being equal (same as the diameter of bump 11; Fig. 4) but fail to specify:

- a) the value of BW being less than D and
- b) the solder bump diameter (D_c)/volume (V_c) being such that D is in a range of D_c - $2D_c$ or VB is in a range of $2V_c$ - $5V_c$ respectively and (H_2-H_1) being less than 5% or 10% of H_2 .

a) Jonaidi teaches using conventional pad/trace design where the solder pad/trace width/BW is less than the diameter/D of the circular pads (width of 20 and pads 18/14 in Fig. 1A/1B; Col. 1 and 2).

Lee et al teach using conventional pad/trace design where the solder pad/trace width/BW is less than the diameter/D of the circular pads (width of 233 and pads 228/230 in Fig. 3A and 4B-8; Col. 7 and 8).

Art Unit: 2811

b) Furthermore, it is a matter of design choice to select the values/dimensions such as D, H1, H2, BW, BL, solder bump volume/VB etc. of various elements including solder pad, solder bar/support, fillet, solder bump, etc. in chip packaging and interconnection technology art to achieve the desired solder bonding strength and reliability.

Barrow teach using a solder joint/bar (26 in Fig. 5) where the solder joint/bar width is less than that of the rectangular pad (pad 18 in Fig. 5).

Thompson teaches using a flattened solder mass/joint (206 in Fig. 2C) having different profile/values for H1, H2 and H3 and the solder mass/joint volume/VB being higher than that of conventional solder bump/VC.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to select the reflowable solder bar comprising the elements a) and b) since such design can improve the solder joint strength, yield and reliability using Jonaidi, Lee et al, Barrow and Thompson's solder bar/pad structures in Dockerty et al.

Response to Arguments

3. Applicant's arguments filed on 02-12-02 have been fully considered but they are not persuasive.

Art Unit: 2811

A. Applicant contends that Dockerty et al do not disclose a reflowable solder bar.

However, as explained above, Dockerty et al disclose the composite solder bar/support comprising high melting temperature(HMT)/low melting temperature (LMT) solders. Furthermore, both LMT and HMT solders are capable of reflowing/reflowable at different temperatures.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 2811

Papers related to this application may be submitted directly to Art Unit 2811 by facsimile transmission. Papers should be faxed to Art Unit via Technology Center 2800 fax center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nitin Parekh whose telephone number in (703) 305-3410. The examiner can be normally reached on Monday-Friday from 08:30 am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas, can be reached on (703) 308-2772. The fax number for the organization where this application or proceeding is assigned is (703) 308-7722 or 7724.

Nitin Parekh

05-16-02

